BRIDGING THE GAP

SCIENTISTS ⟷ MANAGERS

Ecosystem health findings were used to develop the PRIMNM overview booklet, which will serve as the foundation for the creation of the Monument Management Plan.

NOAA ⟷ PUBLIC

Survey results were used to inform a communication strategy for NOAA to educate the public. This consists of five outreach materials, with each material targeting a different awareness gap.

Recommendations

Managers are interested in marine debris, endangered species, and invasive species; however, these parameters are not consistently monitored in PRIMNM. We therefore recommend a realignment of future monitoring so that both science and management goals are met. Additionally, we recommend that survey methods remain unchanged or that calibration years are present to simplify data analyses.

Relevance Beyond the PRIMNM

All the methods used in this project to communicate the health of the PRIMNM are transferable to other Marine Protected Areas around the world. Effective communication of information between all stakeholders is indispensable for establishing successful conservation and management programs. Easily disseminated scientific data is imperative for the management of marine protected areas, and using this data to inform outreach materials that relay the importance of these ecosystems to the general public will garner support for marine conservation efforts. Now more than ever, marine ecosystems need our help, and effective communication can be used to support these large-scale marine conservation efforts worldwide.

Giant clam garden in the PRIMNM. Photo: Amanda Pollock/USFWS.

ACKNOWLEDGEMENTS

There are many people who assisted and supported us in this project. We would especially like to extend our gratitude to our faculty advisor, Mark Buntaine, our PhD advisor, Owen Liu, and everyone who worked closely with us at the National Oceanic and Atmospheric Administration, including Rusty Brainard, Tomoko Acoba, Ivor Williams, Adel Heenan, Bernardo Vargas-Angel, Dione Swanson, Thomas Oliver, Mariska Weijerman, Amanda Dillon, Samantha Brooke, Hokulani Ka'aekuahiwi Pousima, Richard Hall, and Heidi Hirsch. In addition, we would like to thank our external advisors, including the U.S. Fish and Wildlife Service, Darcy Bradley, and Anne Walton.

References: [1] NOAA Pacific Islands Regional Office, Marine National Monument Program [WWW Document], n.d. NOAA Fisheries. URL http://www.fpir.noaa.gov/MNM/mnm_prias.html (accessed 1.18.16). [2] Jefferson, R., McKinley, E., Capstick, S., Fletcher, S., Griffin, H., Milanese, M., 2015. Understanding audiences: making public perceptions research matter to marine conservation. Ocean & Coastal Management 115, 61–70. Header photo credits: USFWS.

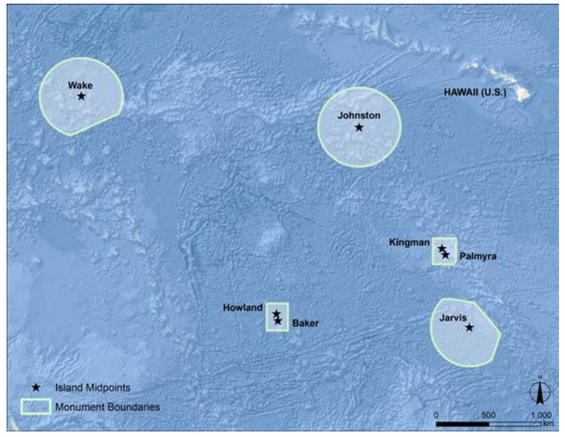
BRIDGING SCIENCE AND MANAGEMENT IN THE PACIFIC REMOTE ISLANDS MARINE NATIONAL MONUMENT

Shannon Boyle, Vanessa De Anda, Kara Koenig, Erin O'Reilly, and Monique Schafer
Faculty Advisor: Mark Buntaine | PhD Advisor: Owen Liu | Project Brief, Spring 2017

INTRODUCTION

Pacific Remote Islands Marine National Monument

The Pacific Remote Islands Marine National Monument (PRIMNM) was first designated in 2009 and expanded in 2014. The PRIMNM is approximately 370,000 square nautical miles and consists of seven islands—Baker, Howland, Jarvis, Johnston, Kingman, Palmyra, and Wake. The PRIMNM is relatively uninhabited and supports a unique network of communities unlike many other reef systems in the world. Although the islands are not subject to direct human pressures, the marine communities are still threatened by climate change. Since these threats are expected to increase in the future, it is important to monitor how climatic and seasonal variability impacts these ecosystems in the absence of direct anthropogenic impacts to help determine what can be done to mitigate these threats.



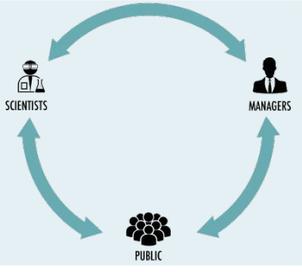
Pacific Remote Islands Marine National Monument islands and boundaries.

Management

The PRIMNM is co-managed by the National Oceanic and Atmospheric Administration (NOAA) and U.S. Fish and Wildlife Service (USFWS). NOAA's science department conducts comprehensive ecosystem monitoring surveys in the PRIMNM in order to answer critical questions on resource status, long-term trends, and efficacy of various management actions. NOAA's management department then uses this information to develop 1) effective management plans in the PRIMNM and 2) public outreach strategies to generate support for their programs. Data in the PRIMNM, however, has not been analyzed and conveyed from the science to the management team. As a result, the PRIMNM Management Plan has not been developed. To better protect and preserve marine ecosystems in the PRIMNM, it is essential for NOAA to foster effective communication between all stakeholders.

MOTIVATION

Evidence shows that agencies must foster effective communication between all stakeholders in order to successfully manage large-scale marine protected areas such as the PRIMNM. However, this project identified significant communication deficiencies between scientists, managers, and the public. To ensure the continued success of the PRIMNM, our work sought to bridge the prevailing gap between 1) scientists and managers as well as between 2) NOAA and the general public.



OVERVIEW REPORT

Objective 1: Effectively communicate PRIMNM coral reef ecosystem health across spatial and temporal scales to resource managers.

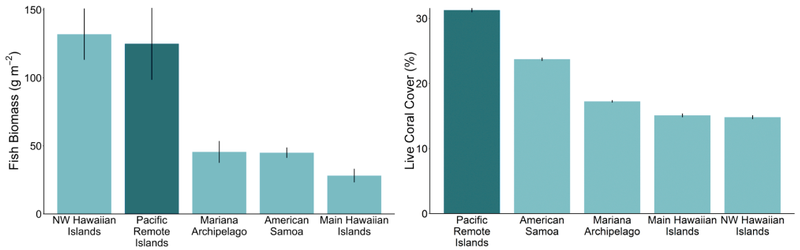
METHODS

Since 2000, NOAA has collected extensive biological, chemical and physical data through periodic cruises to the PRIMNM. Datasets were cleaned, filtered, synthesized and analyzed to determine coral reef ecosystem health across spatial and temporal scales. A multi-metric condition index comprised of multiple coral reef metrics was developed to determine the health of islands within the PRIMNM. Findings were used to complete the first PRIMNM overview booklet that will serve as a tool for resource managers and inform future Monument decisions.

RESEARCH QUESTIONS AND RESULTS

How does the PRIMNM compare to other Pacific regions?

Overall, the PRIMNM fares well when compared to other islands in the US Pacific, often having higher coral cover and fish biomass.



Excellent Good Fair Poor Very Poor

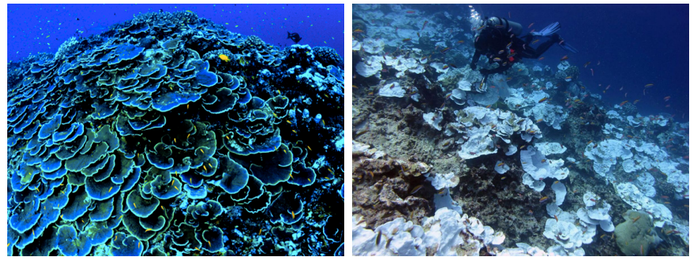
ISLAND	REEF FISH Condition Index	BENTHIC Condition Index	CLIMATE Condition Index	CORAL REEF Condition Index
BAKER				
HOWLAND				
JARVIS				
JOHNSTON				
KINGMAN				
PALMYRA				
WAKE				

What is the overall health of the PRIMNM?

The ecosystem is largely intact due to its remote location and relative absence of human presence. Though the reef fish and benthic condition indexes are predominantly healthy, the climate condition index shows that climate change and recurring climate patterns such as El Niño Southern Oscillation (ENSO) remain a major threat to the Monument and may impact the health of the reef ecosystem. After equally weighing each metric, the overall coral reef health was determined to be good at Howland, Jarvis, Kingman, Palmyra, and Wake, and fair at Baker and Johnston.

What have been the climate impacts at Jarvis Island?

Because of ENSO, Jarvis surpassed the coral bleaching threshold for 43 consecutive weeks between 2015 and 2016. This led to a 98% decrease in live coral cover on Jarvis Island. The picture on the right shows coral communities at Jarvis in 2013, and the picture on the left shows coral communities at Jarvis during the 2015–2016 bleaching event.



Photos: James Maragos/USFWS (left), Woods Hole Oceanographic Institution/Anne Cohen (right).

PUBLIC PERCEPTIONS

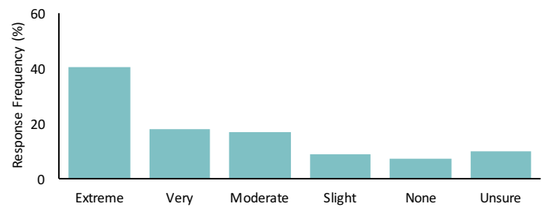
Objective 2: Educate the public on the threat climate change poses to ocean health and increase public awareness of and support for marine conservation efforts.

METHODS

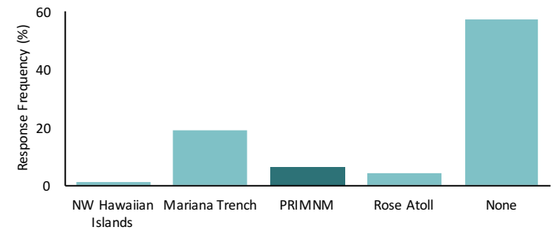
A broad public engagement survey was distributed through SurveyMonkey and completed by 763 respondents across the United States. Biases were decreased by adding dummy variables to various questions; these were then averaged and subtracted from all responses. The survey identified the general public's awareness, perceptions, and knowledge of marine issues and conservation efforts. These survey results were used to inform a strategic communication method that consists of five outreach materials, with each material targeting a different awareness gap.

RESEARCH QUESTIONS AND RESULTS

How much does climate change threaten coral reefs?



Which Marine National Monuments have you heard of?



How aware is the general population regarding marine issues and conservation efforts?

- After correcting for dummy variables, only 6% of respondents have heard of the PRIMNM.
- After correcting for dummy variables, 60% of respondents have never heard of any Monuments in the Pacific.
- Majority considers aesthetic value to be the most important ocean benefit, followed by recreation and food.
- 66% of the population are either unsure or believe they have little to no impact on ocean health.
- Large portion of the public does not know the health status of coral reefs in the Pacific.
- 26% of respondents not believe or are unsure of the extent that climate change poses a threat to coral reefs.
- Public is largely uninformed of the benefits that MPAs provide.

COMMUNICATION MATERIALS

Awareness gaps identified from the survey were used to develop a communication and outreach strategy that consists of two films, an infographic, and two ArcGIS Story Maps. These materials will:

FILM
1. Introduce the PRIMNM
2. Delineate threats to coral reefs

INFOGRAPHIC
3. Promote sustainable activities

STORY MAP
4. Introduce Pacific Monuments
5. Explain benefits provided by MPAs